REMARKS

Reconsideration is requested.

The claims have been amended to advance prosecution, without prejudice.

Support for the amended claim 1 can be found, for example, in the following paragraphs of the U.S. Patent Office publication of the present application (i.e., US 2004/0154658): [0030] ("A solar cell of the present invention includes an electrode coated with lead-free solder. The lead-free solder contains phosphorus (P). "), [0031] ("The amount of phosphorus contained in lead-free solder is preferably 0.00001 to 0.5 mass %. If this amount is less than 0.0001 mass %, the aforementioned advantages due to the addition of phosphorus will not be exhibited. If the amount of phosphorus exceeds 0.5 mass %, the solder will become brittle. In view of the foregoing, the amount of phosphorus contained in the lead-free solder is preferably 0.0001 to 0.05 mass %, further preferably 0.0001 to 0.005 mass %"), [0034] ("In the case of Sn--Ag based solder, a composition having a melting point of 225.degree. C. at most contains 3.5 to 4.5 mass % Ag. There is no composition of this Sn--Ag based solder that has a melting point of 195°C. and below. Thus, the amount of Ag contained is preferably 3.5 to 4.5 mass % for Sn--Ag based solder."), [0035]-[0036] ("The electrode of the solar cell of the present invention can be formed by various methods such as silver paste firing, evaporation, sputtering, plating, or the like. From the standpoint of fabrication efficiency, formation through silver paste firing is preferable. As to the silver paste used in producing the electrode of the solar cell, a silver paste material including, as the main component, powdery silver, powdery glass, an organic vehicle, and an organic solvent, as well as material including illidium chloride and phosphorus oxide can be employed."),

[0061] ("A similar test was conducted with the coating solder of the interconnector altered to Sn--Ag--Cu based lead-free solder. No significant difference was found. "), [0063] (Table 5 - compositions wherein the average grain size of powdery glass in silver paste ranges from 5-20 μm), and [0061] ("A similar test was conducted with the coating solder of the interconnector altered to Sn--Ag--Cu based lead-free solder. No significant difference was found. ").

Support for the amended claim 3 can be found, for example, in the following paragraphs of the U.S. Patent Office publication of the present application (i.e., US 2004/0154658): [0030] ("A solar cell of the present invention includes an electrode coated with lead-free solder. The lead-free solder contains phosphorus (P). "), [0031] ("The amount of phosphorus contained in lead-free solder is preferably 0.00001 to 0.5 mass %. If this amount is less than 0.0001 mass %, the aforementioned advantages due to the addition of phosphorus will not be exhibited. If the amount of phosphorus exceeds 0.5 mass %, the solder will become brittle. In view of the foregoing, the amount of phosphorus contained in the lead-free solder is preferably 0.0001 to 0.05 mass %, further preferably 0.0001 to 0.005 mass %"), [0033] ("In the Sn--Bi--Ag based solder, the amount of Bi contained is preferably 3 to 89 mass %, further preferably 35 to 60 mass %. Such ranges of the amount of Bi are selected as set forth below. In order to conduct a solder dip step without any problems, it is desirable to carry out the dipping step at approximately 195° C., which is the current dip temperature. From the standpoint of property, reliability, and the like, dipping must be carried out at a temperature lower than 225° C. that is the upper limit in practical usage. A composition having a melting point of 225° C. at most corresponds to 5 to 88 mass % Bi when the

amount of Ag contained is 0.1 mass %, and to 3-89 mass % Bi when the amount of Ag contained is 1.3 mass %. A composition having a melting point of 195° C. at most corresponds to 27 to 79 mass % Bi when the amount of Ag contained is 0.1 mass %, and to 35-60 mass % Bi when the amount of Ag contained is 1.3 mass % Ag. Thus, the amount of Bi contained is preferably 3-89 mass %, further preferably 35 to 60 mass % for Sn--Bi--Ag based solder."), [0035]-[0036] ("The electrode of the solar cell of the present invention can be formed by various methods such as silver paste firing, evaporation, sputtering, plating, or the like. From the standpoint of fabrication efficiency, formation through silver paste firing is preferable. As to the silver paste used in producing the electrode of the solar cell, a silver paste material including, as the main component, powdery silver, powdery glass, an organic vehicle, and an organic solvent, as well as material including illidium chloride and phosphorus oxide can be employed."), and [0063] (Table 5 - compositions wherein the average grain size of powdery glass in silver paste ranges from 5-20 μm).

Support for the additional recitation of amended dependent claims 4 and 5 and new dependent claims 19 and 20 can be found, for example, in paragraph [0063] (Table 5 – exemplified compositions of the invention wherein the average grain size of powdery glass in silver paste ranges from 5-11 μm to provide advantageous interconnector detachment rate after temperature-humidity cycle) of the U.S. Patent Office publication of the present application (i.e., US 2004/0154658).

Support for the additional recitation of amended dependent claim 6 and new dependent claim 21 can be found, for example, in paragraph [0066] (Table 6 - exemplified compositions of the invention wherein the amount of powdery glass in silver

paste ranges from 2.8 to 4 mass % to provide advantageous interconnector detachment rate after temperature-humidity cycle) of the U.S. Patent Office publication of the present application (i.e., US 2004/0154658).

Support for the additional recitation of amended dependent claim 7 and new dependent claim 22 can be found, for example, in paragraph [0069] (Table 7 - exemplified compositions of the invention wherein the average thickness of silver electrode ranges from 15-20 μm to provide advantageous interconnector detachment rate after temperature-humidity cycle) of the U.S. Patent Office publication of the present application (i.e., US 2004/0154658).

Support for the additional recitation of amended dependent claims 15, 23 and 24 can be found, for example, in paragraph [0033] ("In the Sn--Bi--Ag based solder, the amount of Bi contained is ... preferably 35 to 60 mass %.") of the U.S. Patent Office publication of the present application (i.e., US 2004/0154658).

Support for the additional recitation of amended dependent claims 16-18 can be found, for example, in paragraph [0033] ("A composition having a melting point of 195° C at most corresponds to 27 to 79 mass % Bi when the amount of Ag contained is 0.1 mass %") of the U.S. Patent Office publication of the present application (i.e., US 2004/0154658).

No new matter has been added. The amended claims are not believed to raise new issues requiring further search and/or consideration. Entry of the present Amendment and consideration of the above and the following remarks are requested.

Claims 2 and 11-14 have been canceled, without prejudice.

Claims 19-24 have been added.

Claims 8-10 have been withdrawn from consideration.

Claims 1-10 and 15-18 are pending. Upon entry of the present Amendment, claims 1, 3, 4-10 and 15-24 will be pending.

Entry of the present Amendment is requested. Rejoinder and allowance of any claim defining a method of making and/or using a product defined by an allowable claim, at an appropriate time, are requested.

The Section 112, first paragraph "written description", rejection of claims 3-7, 15, 17 and 18 is obviated by the above amendments. The objected to alleged new matter has been deleted to advance prosecution and without prejudice. Support for the amended claims in the specification is noted above. Entry of the present Amendment and withdrawal of the Section 112, first paragraph, rejection are requested.

The Section 103 rejection of claims 1, 2 and 4 over Nagahara (U.S. Patent No. 4,737,197) in view of Hwa (U.S. Patent Application Publication No. 2003/0007886) is obviated by the above amendments. Reconsideration and withdrawal of the rejection are requested in view of the above and the following distinguishing comments.

Upon entry of the present Amendment, the rejection will be moot with regard to claim 2.

The cited combination of art fails to teach or suggest the invention of the above claims 1 and 4 in that, at a minimum, there is no teaching or suggesting in the cited combination of art to include the claimed range of phosphorous in a lead-free solder. The cited Hwa publication teaches compositions containing 0.01% phosphorous. See ¶[0010], [0014] and [0035] for example. The description of phosphorous in Nagahara is understood to relate to the composition of the electrode (**4**) of Nagahara and not the

solder (**5**) of Nagahara. Nagahara fails to describe any specific solders. See column 2, lines 16-17 of Nagahara. The cited combination of art would not have suggested a solar cell of the claims which includes a solder containing 0.005 to 0.0001 mass % phosphorous of the above claims. The cited combination of Nagahara and Hwa would not have suggested a solar cell of the claims which includes a silver electrode containing powdery glass having an average particle size of 5-20 μm.

Entry of the present Amendment and withdrawal of the Section 103 rejection of claims 1, 2 and 4 over Nagahara and Hwa are requested.

The Section 103 rejection of claims 5-7 over Nagahara, Hwa and Yoshida (U.S. Patent No. 4,256,513) is obviated by the above amendments. Reconsideration and withdrawal of the rejection are requested in view of the above and the following distinguishing comments.

Claims 5-7 are dependent from claim 4 and are submitted to be patentable over the combination of Nagahara, Hwa and Yoshida for reasons noted above with regard to claim 4 as compared to Nagahara and Hwa. The additional teachings of Yoshida are not believed to cure the deficiencies of Nagahara and Hwa noted above.

To the extent Yoshida could or would have been combined with Nagahara and Hwa, Yoshida teaches use of powdery glass with a particle size of less than 1 μm, as noted by the Examiner on page 5 of the Office Action dated July 20, 2007. There is no suggestion or motivation in the cited art to have included powdery glass, as claimed, with an average particle size of 5 to 11 μm.

Moreover, Yoshida describes a conductive paste at column 11, lines 10-19 containing 7-9 % by weight of glass. Yoshida specifically teaches that "Deviation of the

composition percentages of the solid components [including the 7-9 % by weight glass] from the values above will greatly deteriorate the performance of the solar cell ..." (emphasis added). In this way, Yoshida may be considered to teach away from the recitation of claims 6 and 21 above.

Finally, the electrode thickness of "larger than 100 μm" of Yoshida, would not have led one of ordinary skill to have made the invention of claims 7 and 22 above, even when combined with Nagahara and Hwa.

Entry of the present Amendment and withdrawal of the Section 103 rejection of claims 5-7 over Nagahara, Hwa and Yoshida are requested.

The Section 103 rejection of claims 2-4, 17 and 18 over Nagahara and Kruppa (DE 10117404, 2 page English translation provided by Examiner) is obviated by the above amendments. The separate Section 103 rejection of claims 15 and 16 over Nagahara and Kruppa is obviated by the above amendments. Reconsideration and withdrawal of the rejection are requested in view of the above and the following distinguishing comments.

Upon entry of the present Amendment, the rejection will be moot with regard to claim 2.

The cited combination of art fails to teach or suggest the invention of the above claims 3, 4, 15, 16, 17 or 18, in that, at a minimum, there is no teaching or suggesting in the cited combination of art to include the claimed powdery glass having an average particle size of 5 μm to 20 μm. Moreover, the cited documents fail to predict the unexpected advantages demonstrated, for example, in ¶[0063] of the present application from the inclusion of the same. As noted above, Nagahara fails to describe

any specific solders. See column 2, lines 16-17 of Nagahara. The cited combination of art would not have suggested a solar cell of the claims which includes a solder containing 0.005 to 0.0001 mass % phosphorous of the above claims, or the advantages of including the same.

Entry of the present Amendment and withdrawal of the Section 103 rejections of claims 3, 4, 15, 16, 17 and 18 over Nagahara and Kruppa are requested.

The claims, as amended, are submitted to be in condition for allowance and entry of the present Amendment and a Notice of Allowance are requested. The Examiner is requested to contact the undersigned, preferably by telephone, in the event anything further is required in this regard.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: /B. J. Sadoff/
B. J. Sadoff
Reg. No. 36,663

BJS:
901 North Glebe Road, 11th Floor
Arlington, VA 22203-1808
Telephone: (703) 816-4000
Facsimile: (703) 816-4100